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May 17, 2004

FILED ELECTRONICALLY

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: RM-10821; Wireless Telecommunications Bureau Seeks Comment On MariTEL, Inc. Petition for Declaratory Ruling and National Telecommunications and Information Administration Petition for Rulemaking Regarding the Use of Maritime VHF Channels 87B and 88B; NOTICE OF EX PARTE PRESENTATION;

PR Docket No. 92-257; Amendment of the Commission's Rules Concerning Maritime Communications; NOTICE OF EX PARTE PRESENTATION;

ET RM-10743; Commission's Rules to Promote the Use of VHF Public Coast Station Frequencies; NOTICE OF EX PARTE PRESENTATION.

Dear Ms. Dortch:

Pursuant to the provisions of Section 1.1206 of the rules and regulations of the Federal Communications Commission ("FCC"), MariTEL, Inc. hereby submits this letter notifying the FCC of its *ex parte* presentation in the above-referenced dockets. On May 14, 2004, the undersigned sent a written *ex parte* letter from Dan Smith, President and Chief Executive Officer of MariTEL, Inc., to John Muleta, Chief of the Wireless Telecommunications Bureau. The letter responds to the National Telecommunications and Information Administration's ("NTIA's") letter providing the FCC with a copy of the Department of Defense Joint Spectrum Center ("JSC") EMC Analysis of AIS and Public Correspondence Systems in the Maritime VHF Band ("JSC Report"). A copy of the written *ex parte* letter is attached.

Should there be any questions regarding this matter, please contact the undersigned directly.

Cordially yours,

/s/ Russell H. Fox

Russell H. Fox

Attachment

cc: C.I. Pearson (via FedEx)
Frederick R. Wentland (via FedEx)
Kathy D. Smith (via FedEx)
John Muleta (via e-mail)
D'Wana Terry (via e-mail)
Catherine Seidel (via e-mail)
Tim Maguire (via e-mail)
Scot Stone (via e-mail)
Jeffrey Tobias (via e-mail)

May 14, 2004

Mr. John B. Muleta
Chief, Wireless Telecommunications Bureau
Federal Communications Commission
The Portals
445 12th Street, S.W.
Washington, DC 20554

Re: **Response to Introduction by the National Telecommunications and Information Administration ("NTIA") of the Department of Defense Joint Spectrum Center ("JSC") EMC Analysis of AIS and Public Correspondence systems in the Maritime VHF Band ("JSC Report")**

Dear Mr. Muleta,

MariTEL recently obtained a copy of the NTIA's letter ("NTIA Comments") providing the Federal Communications Commission ("FCC" or "Commission") with a copy of the JSC Report. As you know, MariTEL is the exclusive geographic FCC licensee of VHF Public Coast Station (VPC) spectrum in all maritime areas and party to several proceedings before the Commission regarding the Federal government's introduction of simplex Automatic Identification System ("AIS") technology into commercial spectrum. MariTEL's experience of providing maritime services and plans to soon launch new and innovative wireless data communication services provide a unique perspective on these proceedings. Although the JSC Report was admittedly a matter of public record earlier, contrary to MariTEL's reasonable expectations, a copy was not provided to MariTEL when it was submitted by the NTIA to the FCC. Therefore, MariTEL wishes to take the opportunity of this correspondence to address the NTIA's *ex parte* inclusion of the JSC Report in the record of the several proceedings

Executive Summary

The NTIA Comments only very briefly acknowledge the JSC Report's conclusions regarding the severity of simplex AIS interference ("AIS Interference"). Instead, in an apparent attempt to obfuscate the clear findings of the report, the NTIA concludes that 1) "AIS signals may not significantly impact issues surrounding communications performance" and 2) that other users of the VHF maritime band can "protect themselves" by adopting "current state-of-the art" digital radio communications technology. In effect, the NTIA Comments lead the reader to conclude that AIS Interference is comparable to the existing RF environment and additional interference from simplex AIS can be easily mitigated with "current state-of-the-art" radio technology.

Nothing is further from the truth. The clear findings of the JSC Report and other similar engineering reports are that 1) simplex AIS operations cause widespread interference throughout the VHF maritime band, 2) the use of AIS simplex transmissions is infinitely more destructive than current levels of interference and 3) deployment of current radio technology is not a technically or commercially viable solution to the interference caused by simplex AIS use. MariTEL recently met

with NTIA officials to discuss these findings and propose other methods for potentially mitigating AIS Interference. Although no consensus was reached, the NTIA's staff agreed to revisit the impact of introducing simplex AIS into the VHF band, evaluate MariTEL's new technology proposal, and provide additional feedback to MariTEL in the near future.

It is abundantly clear from the record that simplex AIS technology is infinitely more destructive than current levels of interference ("Non-AIS Interference") in the VHF maritime band. The result is that all vessels equipped with or in close proximity to a simplex AIS device will lose the ability to effectively communicate with VHF coast stations. The only plausible solution is to develop a "technology fix" that allows both AIS and other uses of the VHF band to effectively co-exist. AIS Interference is a direct result of the Federal Government's implementation of a disruptive radio system. Therefore, MariTEL's solution to overcome AIS interference can and should only be realized with financial and regulatory support from the FCC and NTIA.

Discussion

MariTEL's analysis of the JSC Report and other similar engineering reports lead to only one conclusion – that there is a widespread and debilitating impact of simplex AIS to other uses of the maritime spectrum. These engineering reports also show that AIS Interference is infinitely more destructive to the maritime spectrum than Non-AIS Interference and that deployment of currently available radio technology is neither technically nor commercially viable. Each of these key topics is discussed in more detail below.

I. Results from Multiple Studies Agree on the Impact of Simplex AIS

Included in the record of the various proceedings before the FCC are two separate software simulation reports[1] as well as an actual equipment testing report[2]. All of these reports demonstrate that use of simplex AIS technology creates widespread interference to other uses of the adjacent maritime channels, which can only be eliminated through extreme geographic and frequency separation. Specifically, the JSC Report provides the following frequency and geographic separation requirements to eliminate AIS Interference as a result of a single AIS device installed on a vessel.[3]

VPC Communications	Frequency Separation	Horizontal Separation
VHF/FM Voice Mode	25kHz (1 channel)	1.9 miles
	75 kHz (3 channels)	1.4 miles
	~6 MHz (~240 channels)	.095 miles
Data Mode	25kHz (1 channel)	2.6 miles
	50 kHz (2 channels)	1.14 miles
	75 kHz (3 channels)	1.04 miles
	~6 MHz (~240 channels)	.37 miles

The simulation results demonstrate that, while other uses of the maritime spectrum are affected up to 6 MHz away, AIS Interference is most severe near each AIS equipped vessel and on channels in close proximity to the AIS transmitter frequencies. Measured results from the JSC Report show extreme interference to channels adjacent to simplex AIS transmissions and substantial interference more than six channels away[4]. Subsequent testing of commercially available type accepted equipment confirms the predictions of the simulations that voice and data communications on all of

[1] inCode simulation based on the Shared Site Interference (SSI) model and the JSC simulation based on Cosite Analysis Model Version 5.2, JSC-UM-98

[2] The inCode Report includes equipment testing of a type approved AIS transmitter's impact on a commercially available wireless data device.

[3] A system is operating normally without regard to any AIS interference; the conditions wherein the system performance is the same as before the AIS interference.

[4] JSC Report, Figure B-6 shows un acceptable levels of interference from an AIS transmitter. The average interference to channel 28 (located between AIS transmitter channels) is +10 dBm and the impact to channels up to six channels on either side of an AIS transmission is between 0 dBm and-35 dBm.

MariTEL's licensed channels are significantly impacted in the presence of an AIS transmitter operating in the simplex mode on coast station frequencies[5].

II. AIS Interference is Infinitely More Destructive to the Maritime Spectrum than Non-AIS Interference

The NTIA suggests that AIS Interference is comparable to Non-AIS Interference from such sources as pager systems, land mobile systems and National Oceanographic Atmospheric Administration weather radio transmissions ("NOAA Transmissions"). Further, NTIA attempts to minimize AIS Interference by stating that the maritime VHF band has an inherently high level of interference due to an intense electromagnetic environment and implies that MariTEL's proposed data service would, even without the introduction of AIS, be required to employ mitigating options that would also provide adequate protection from AIS Interference. [6]

MariTEL, based upon extensive experience operating a near nationwide VHF-FM network, is very familiar with the impact of Non-AIS Interference on maritime networks as discussed in the RTCM 87-99/SC117-STD recommendation ("RTCM Standard"). MariTEL's experience is that these types of intensive RF conditions are geographically isolated anomalies[7] and affect less than 1% of the maritime service area. Because of the limited nature of these environments, MariTEL believes that discrete engineering techniques, such as switching users to other channels, adding system filters or relocating shore station sites[8] is appropriate, rather than redesigning equipment to eliminate Non-AIS Interference. While MariTEL fully supports the voluntary RTCM Standard for those users in intense, localized electromagnetic environments who do not have access to the use of simple, industry accepted engineering solutions, MariTEL has not identified a need to employ products complying with the enhanced voluntary RTCM Standard and plans continued use of off-the-shelf technology along with standard engineering techniques to mitigate Non-AIS Interference.

Simplex AIS technology, however, introduces an entirely new form of interference into the maritime spectrum that is unique in at least three significant ways: it increases the *Interference Power*, expands the *Interference Coverage* and increases the amount of *Spectrum Impacted*.

Interference Power: The RTCM Standard defines a voluntary receiver specification to overcome locally intense RF environments but understandably fails to contemplate AIS Interference. The RTCM Standard considers that the interference is no closer than 500 kHz to the victim receiver whereas AIS transmitter frequencies are directly adjacent to MariTEL's coast station frequencies. Further, the power levels of AIS Interference can be more than one hundred fifty times greater than considered by the RTCM Report as an "intensive RF environment". As such, even VHF receivers that comply with the voluntary RTCM standard will potentially fail in the presence of AIS Interference. Additionally, simple engineering techniques to alleviate the interference are not available because there is insufficient spectral separation between the interferer and receiver.

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[5] inCode Report, Interference Considerations of Simplex Operation 1371 AIS Technologies With Respect to MariTEL's Spectrum, Diagram 9, Page 19.

[6] Letter from Frederick Wentland, NTIA dated 2/26/2004 to Federal Communications Commission, transmitting JSC Report.

[7] MariTEL is well aware of pager and NOAA systems operating in close proximity to its licensed channels and have engineering guidelines to add system filters to eliminate the effects of the interference.

[8] Duplex systems are often more conducive to simple filtering techniques than simplex systems.

Interference Coverage: The RTCM Standard defines locally isolated intensive RF environments that, from MariTEL's experience, cover less than 1% of the maritime service area. In stark contrast, a vessel equipped with AIS will be impacted in 100% of the maritime service area and, under certain conditions, will impact communications of other vessels greater than two miles away. In other words, the less intrusive Non-AIS Interference must be accounted for in only 1% of the maritime service area whereas the very intrusive AIS Interference must be accounted for in 100% of the maritime service area.

Spectrum Impact: The RTCM Standard primarily discusses the impact to VHF receivers from high-energy noise sources emanating from beyond spectrum currently allocated for maritime services.[9] However, the RTCM Standard understandably does not address the impact to receivers from simplex interference within the maritime spectrum. In addition to overpowering or desensitizing the receiver, AIS Interference also reduces the range of a receiver by raising the noise floor within a receiver channel. For example, Federal guidelines for a "normal" noise floor are ~100 dBm[10]. According to the JSC Report, when a simplex AIS device is installed on a vessel, the noise floor can be expected to exceed –37 dBm - or 2 million times the expected power - across all of MariTEL's licensed channels[11].

III. MariTEL's deployment of Currently Available Radio Technology is Not a Technically or Commercially Viable Solution

Realizing that eliminating AIS Interference through extreme geographic and frequency separation is not viable, the only obvious solution is to develop a "technical fix" allowing both AIS and other uses to effectively share the spectrum. Two primary approaches exist for a technical solution: 1) fix AIS or 2) force other users of VHF spectrum to "protect themselves".

Fix AIS: MariTEL continues to stress that the impact of AIS Interference can be significantly reduced by simply modifying the domestic type approval process and shipboard installation requirements to mitigate the most egregious characteristics of AIS devices. Considering that the AIS Class A IEC specification is being modified, the Class B specification is not yet complete, and non-ship based AIS specifications have barely begun, now is the appropriate time[12] to most effectively mitigate AIS Interference. The Commission should appropriately shape international AIS standards or, at minimum, establish domestic type acceptance and shipboard installation requirements to better support U.S. spectrum policy.[13]

In addition to fixing the AIS transmitter, the FCC and NTIA should also take necessary steps to insure that AIS receivers meet the voluntary RTCM Standard. The RTCM Standard is significantly more stringent than the current AIS receiver standard and is designed to protect key communication systems from failure in certain US locations where intense electromagnetic environments exist. Failure of AIS receivers to meet known U.S. receiver requirements that, in certain instances may be susceptible to failure represents an unnecessary risk to the safety of life and property at sea.

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[9] Identified interferers include Paging, NOAA and Land Mobile transmissions.
[10] NTIA RedBook Annex I Page I-3
[11] JSC Report, Figure B-6
[12] Approximately 15,000 vessels are required to install spectrally inefficient AIS transponders by December 31, 2004.
[13] Based on the precedent of similar US actions to append International recommendations with more stringent guidelines based on of US needs such as in the case of RTCM SC117 recommendations.

Force Other Users of VHF Spectrum to "Protect Themselves": Without an effective technical fix for AIS, other uses of the maritime spectrum will be forced to accept severe limitations of the expected spectrum utility. Particularly impacted is any communication to a vessel equipped with a simplex AIS device.

Other users of the maritime spectrum may consider employing very taxing error correction techniques to "protect themselves". The JSC Report implies, and the NTIA seems to endorse, use of error correcting techniques (such as Forward Error Correction (FEC) codes and interleaving) as an effective method to mitigate AIS Interference. Unfortunately, this solution is neither technically or commercially viable for the following reasons:

1. There are no commercially available devices to "overcome AIS". While certain FEC codes are widely available in wireless devices, these systems are designed primarily to improve RF coverage of a weak or "faded" signal rather than to overcome strong co-channel channel interference[14]. Additionally, FEC codes are often used on a dynamic basis versus being used in all occasions; therefore, only being used in a fraction of the total service area. The JSC Report's recommended use of FEC codes, comparably, requires the use of FEC codes in the entire service area.

   To overcome AIS Interference, a new "customized" device must be developed to implement the FEC codes recommended by the JSC Report[15], and to mitigate the high power of simplex AIS transmissions. Even if such a device can be developed, the resultant cost may not be commercially viable[16]. Regardless, an FCC licensee should not be burdened by overcoming interference as a result of the Federal government's implementation of a disruptive radio system.

2. Implementation of the JSC recommended FEC codes reduces channel capacity by ~40%. Error correcting techniques are designed to exchange channel capacity for error correcting bits so as to eliminate retransmissions in the event an error occurs. The impact of error correcting techniques to channel capacity is directly related to the nature and severity of the expected interference. The JSC Report's recommended FEC codes, and associated 40% reduction in throughput, is an accurate reflection of the severity of AIS Interference.

3. The JSC recommended FEC codes are not compatible with 2nd and 3rd generation high-speed data systems[17]. It is critical to understand that the JSC suggested FEC codes are only applicable to a low speed data device[18] and are not compatible with higher speed

[14] Co-Channel interference is the result of simplex AIS emission skirts propagating energy into a duplex receiver's channel.
[15] The JSC Study only states that use of the FEC codes "may" mitigate the AIS Interference at a cost of 40% throughput. Actual FEC code implementation may be worse.
[16] So-called Project 25 ("P25") digital radios have historically cost greater than $2,000. While some vendors are now planning to sell reduced functionality P25 radios for slightly higher than $1,000, these units are still significantly higher than radios available for the maritime market which the Coast Guard states start as low as $80.
[17] 2nd generation refers to systems achieving data rates up to 56 kbps and 3rd generation refers to systems achieving data rates greater than 56 kbps.
[18] 22 kbps capacity to get 13.5 kbps data throughput

data systems[19] where greater than 60% of the channel capacity may be sacrificed to overcome AIS Interference.

The only plausible way for other users to protect themselves is the development of devices that employ customized techniques to communicate "around" AIS interference. While not eliminating AIS interference, this approach envisions technologies that are aware of AIS and use the 99.5% of the time that an AIS transmitter is not transmitting to communicate with a vessel. The most effective implementation of this technology is in the form of an integrated, multifunction AIS / wireless data device. Both funding[20] and regulatory support are required to develop products to successfully overcome AIS Interference that is a result of the Federal government's introduction of a new digital radio system.

Conclusion:

It is abundantly clear that simplex AIS devices cause widespread interference that is infinitely more destructive than current levels of interference in the VHF maritime band. The only plausible way forward is the development of a technology fix, which allows both AIS and other uses of the VHF band to effectively co-exist. Based on these realities, MariTEL urges the Commission to quickly adopt appropriate regulations that address the detrimental impact of AIS Interference and facilitate effective sharing of the maritime band. We urge the Commission to adopt MariTEL's Sharing Proposal framework to protect our licensed rights granted through FCC auction and to ensure the maritime VHF band is fully utilized.

Sincerely,

Dan Smith
President and CEO

[19] One vendor in particular is already testing high-speed VHF data solutions using a 25 kHz channel and realizing a data rate of 95 kbps.

[20] In *ex parte* comments submitted May 6, 2004 related to the AIS proceedings, MariTEL provided estimates of the amount of funding needed to develop products to overcome AIS Interference.